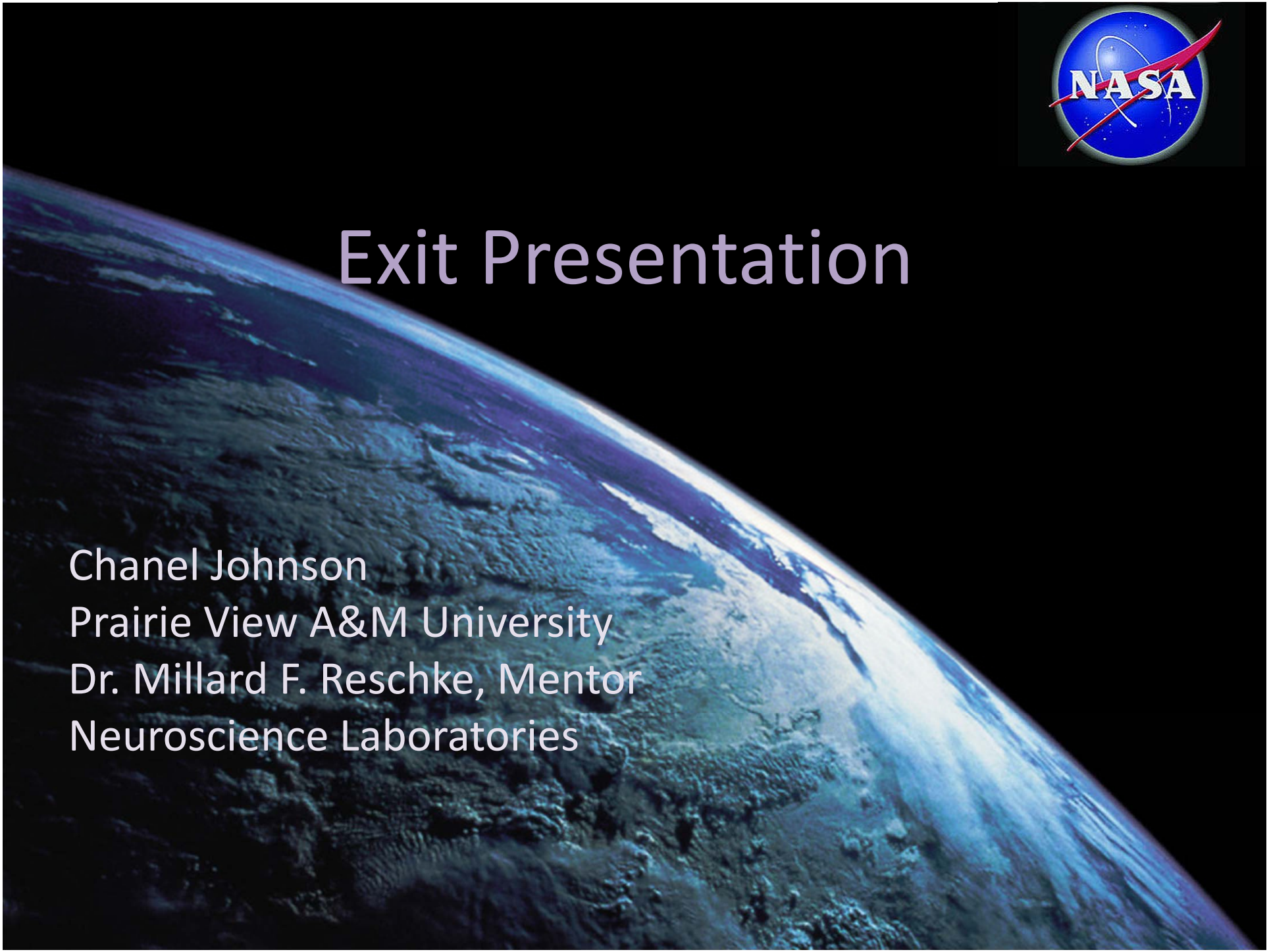


Exit Presentation

Chanel Johnson
Prairie View A&M University
Dr. Millard F. Reschke, Mentor
Neuroscience Laboratories

Introduction

University
[illegible]
7

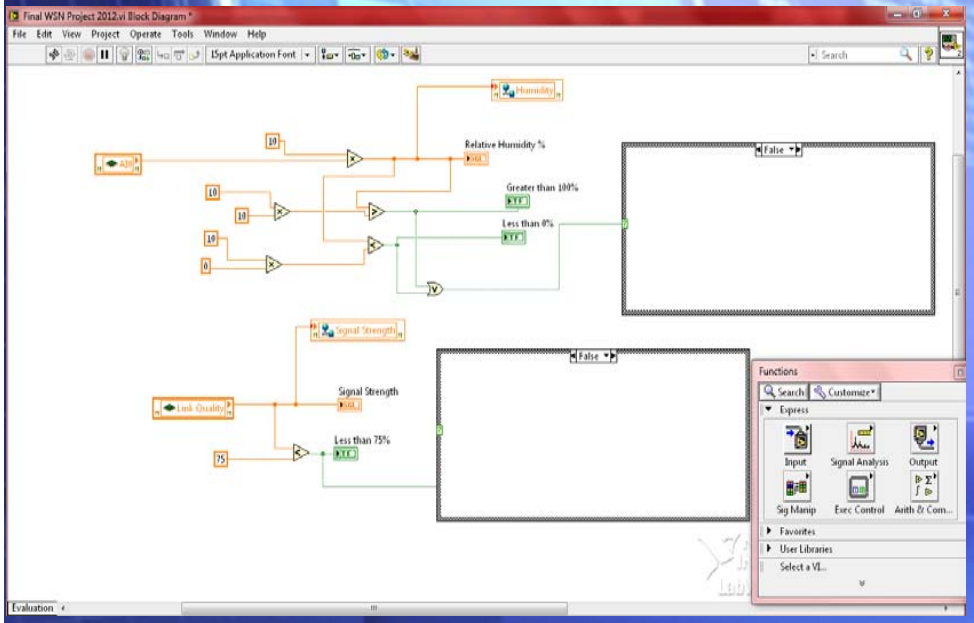
Transferred to Prairie View A&M University, Fall 2013

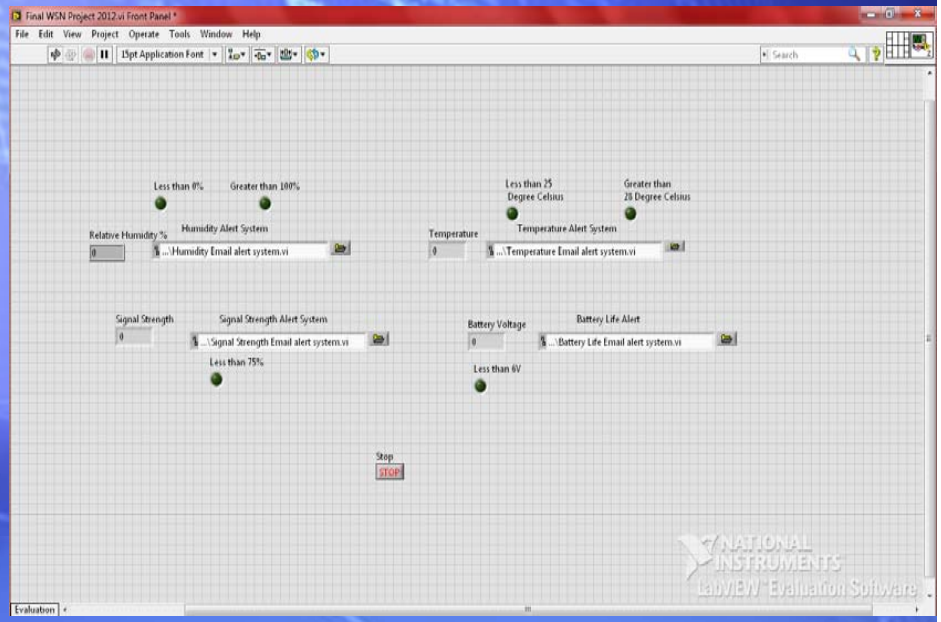
Most Outstanding Junior Computer Engineering Student Fall 2013 – Spring 2014

Graduation date: May 2016

Research at PVAMU

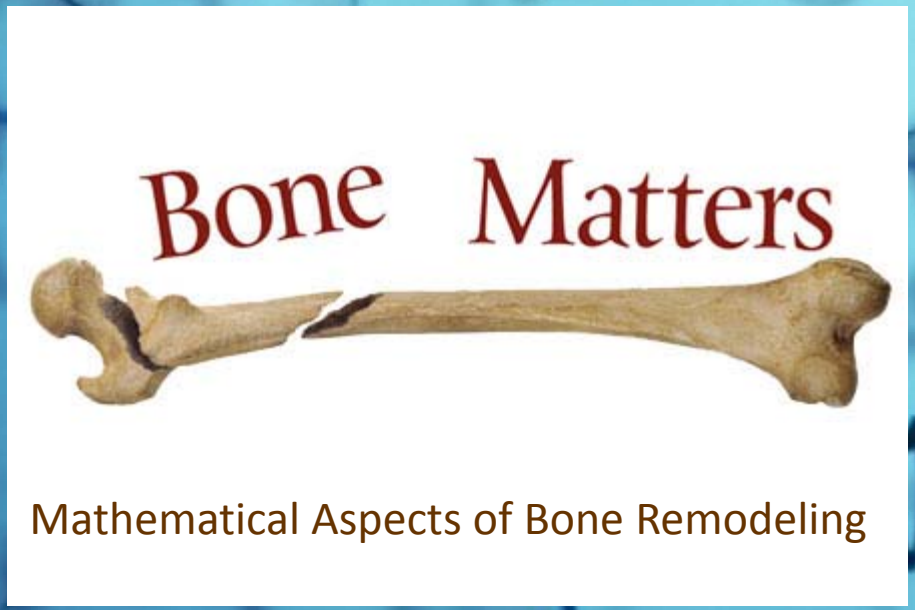
- Wireless Sensor Network for Smart Irrigation
  - Intro to LabVIEW 2012



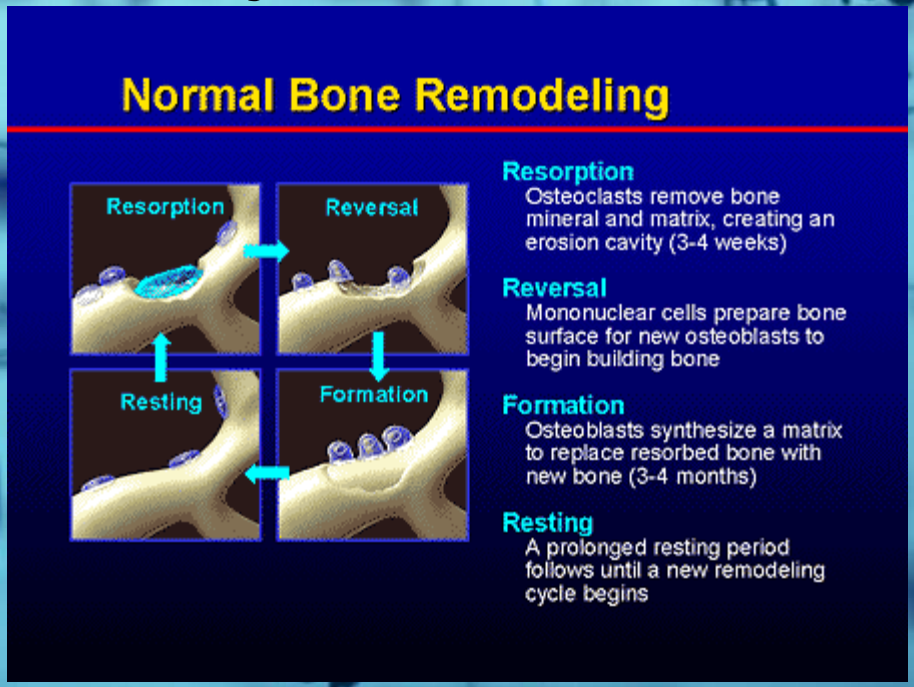


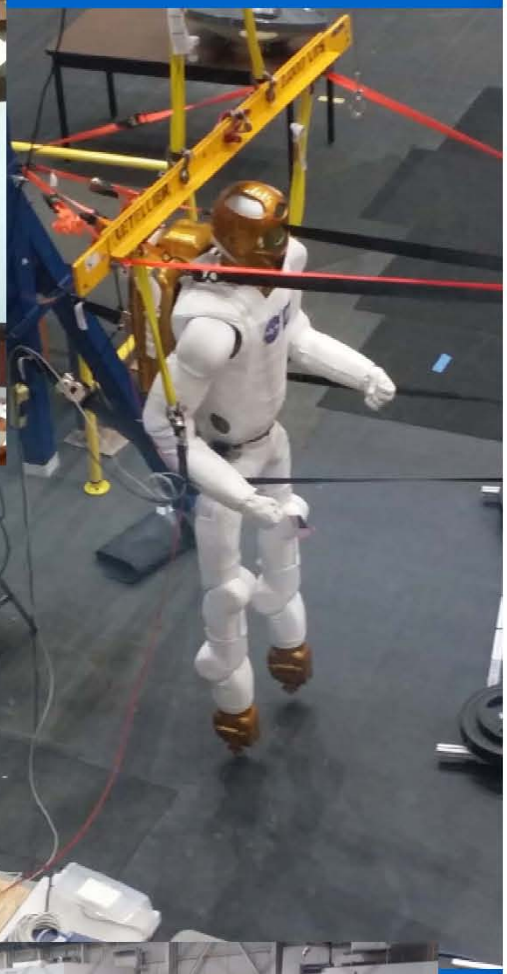
Research at PVAMU - NSTI

- Development of technologies for elucidation and mitigation of bone loss in microgravity, osteoporosis and inflammatory disease



Mathematical Aspects of Bone Remodeling






FGB
ZARYA
(SUNRISE)


WELCOME TO THE NBL
EAST

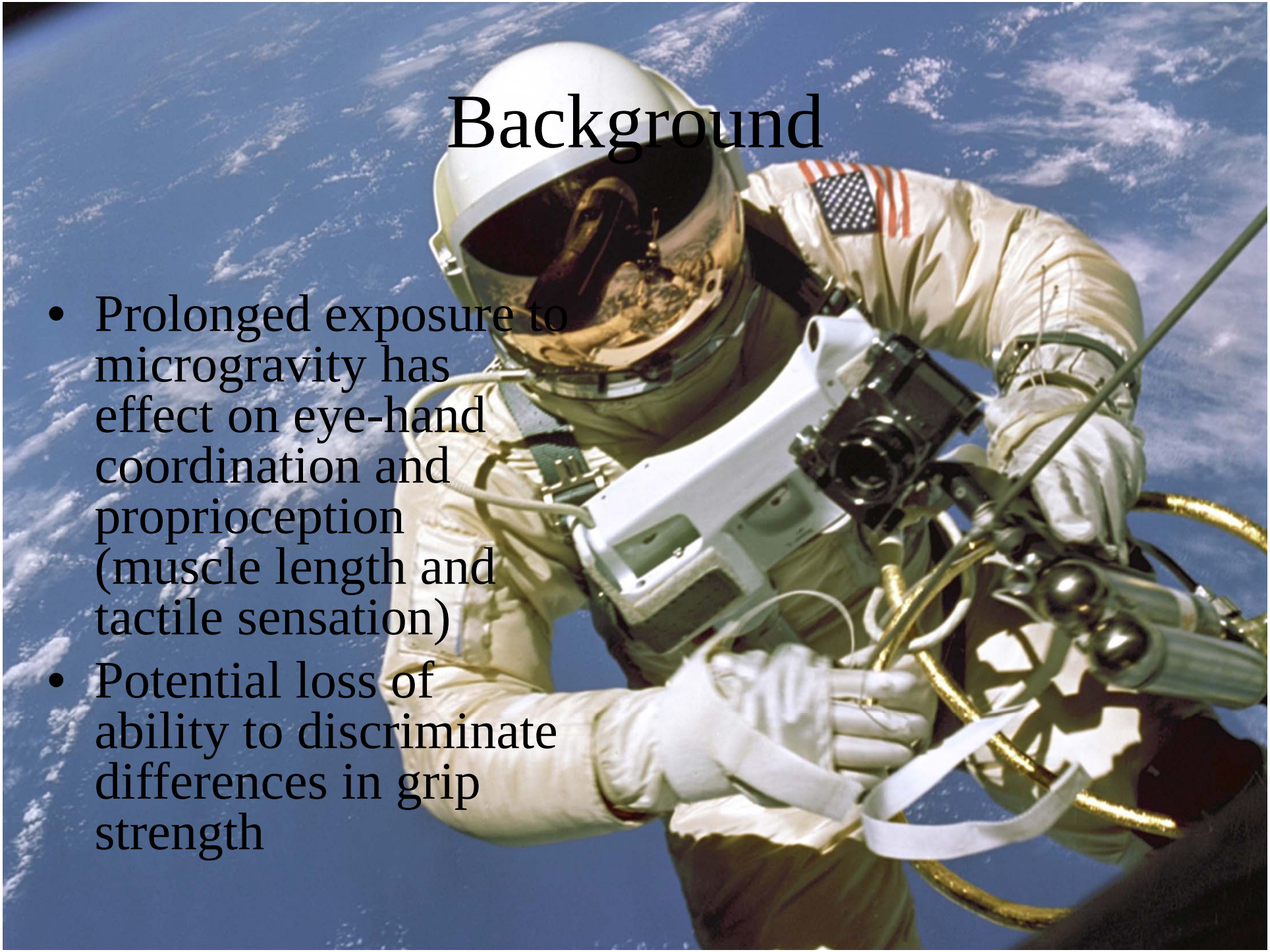
Neuroscience Laboratories

- Research Areas
  - Motion
  - Neuroautonomy
  - Off-Vertical Axis Rotator(OVAR)
  - Postural Control
  - Preflight Adaptation and Virtual Reality Training
  - Sensorimotor
  - Short-Arm Centrifuge
  - Visual-Vestibular (Gaze)

Objectives of Internship

- Recovery of Functional Sensorimotor Performance Following Long Duration Space Flight (Field Test)
  - Validate Force Discrimination and Memory protocol for Field Test
- Effects of Fatigue on Force Discrimination
  - Using fatigue protocol to induce changes in ability to discriminate forces and modify muscle memory

Background



- Prolonged exposure to microgravity has effect on eye-hand coordination and proprioception (muscle length and tactile sensation)
- Potential loss of ability to discriminate differences in grip strength

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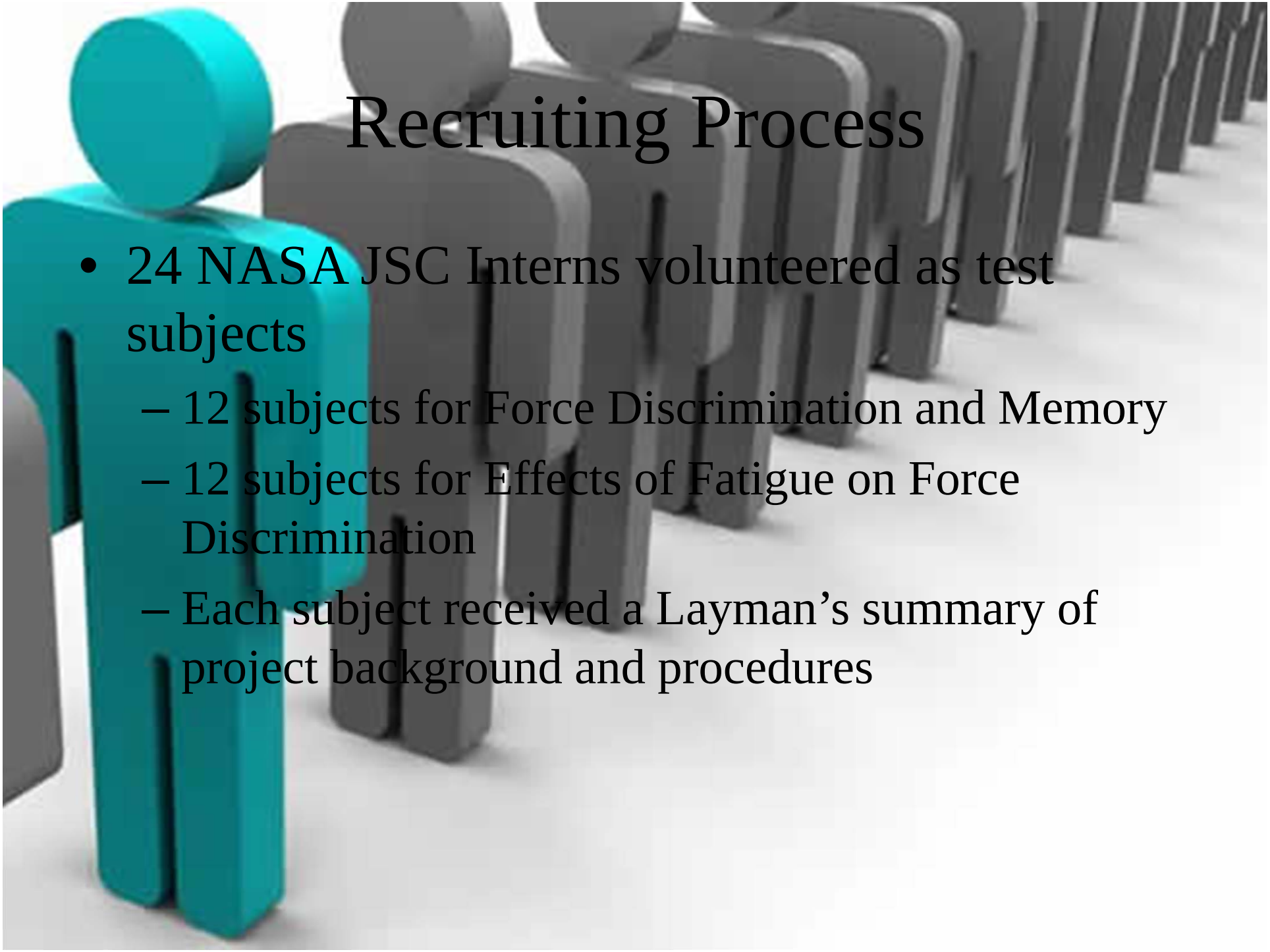
- nical and safe
- nsent To Be A esearc
  tudy
- logics, and Medical De
  Hazards
- nt, Injury, Compensation Information
- Withdrawal and/or Termination
- t Record Confidentiality and Authorization to
  ted Health Information (PHI)
- natures

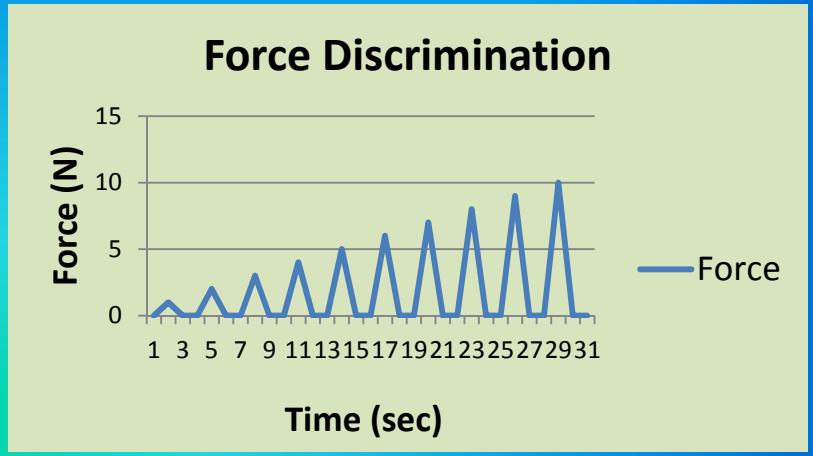


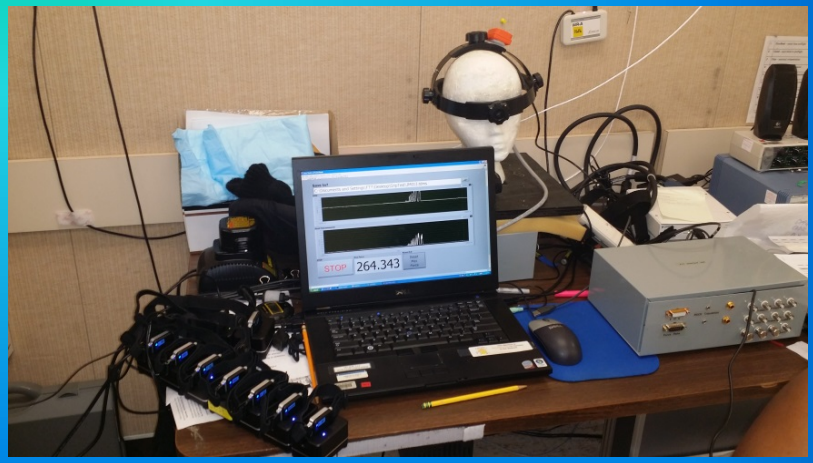
Recruiting Process

- 24 NASA JSC Interns volunteered as test subjects
  - 12 subjects for Force Discrimination and Memory
  - 12 subjects for Effects of Fatigue on Force Discrimination
  - Each subject received a Layman's summary of project background and procedures

Experimental Protocol

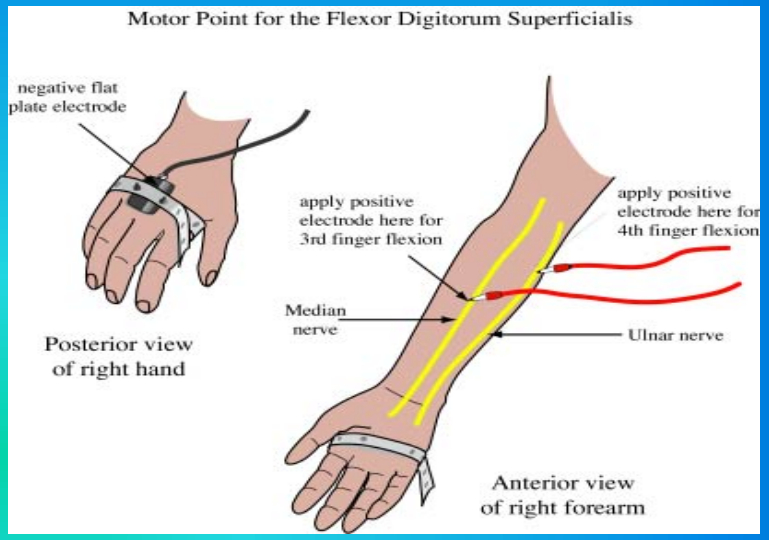
- Force Discrimination and Memory
  - Force discrimination tasks
  - Dominant hand 30% maximal voluntary contractions (MVC) to target
    - 30s contraction eyes open
    - 5 contractions eyes open
    - 5 contractions eyes closed
    - 5 contractions eyes open
  - Non-dominant hand 30% MVC
    - 5 contractions eyes closed

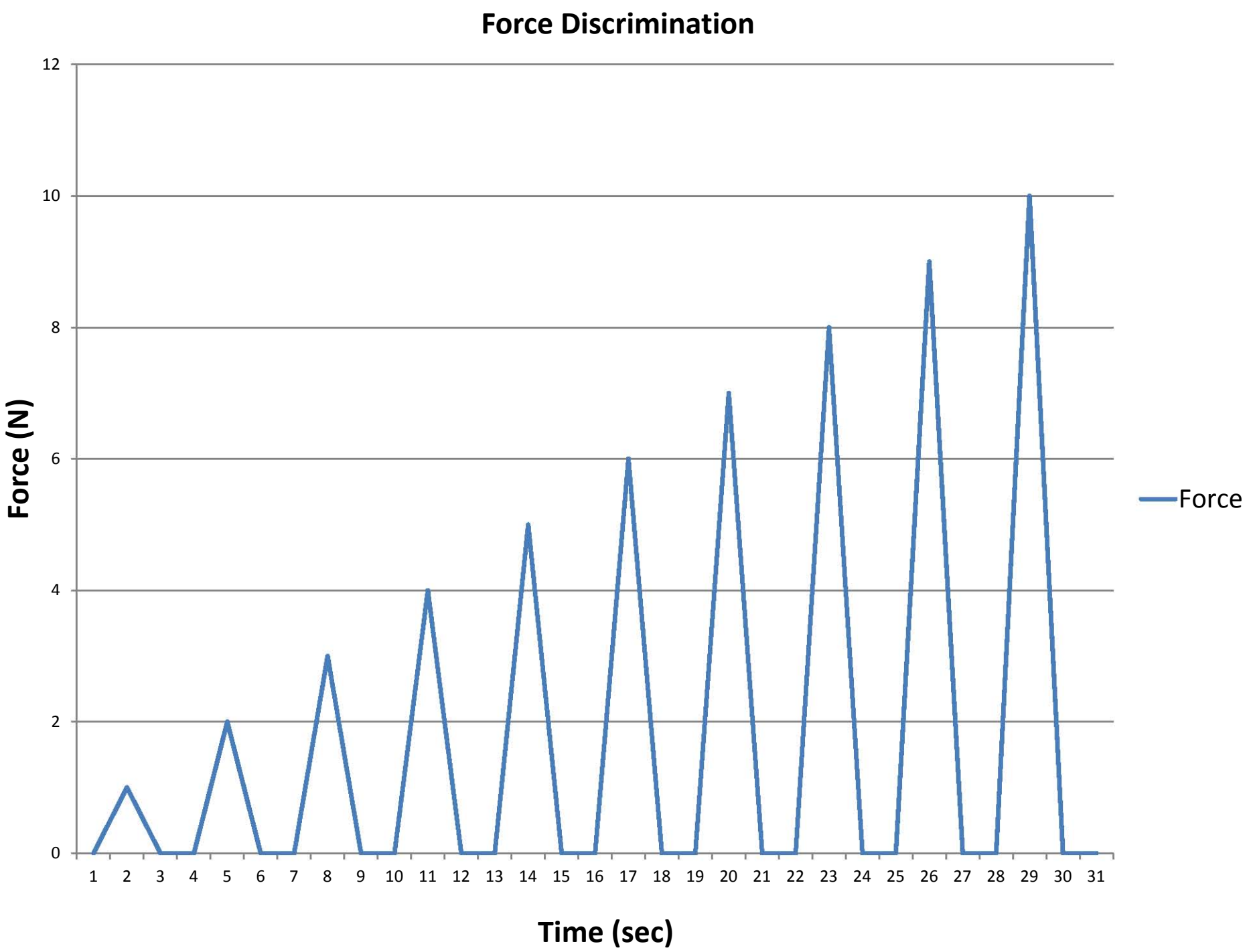


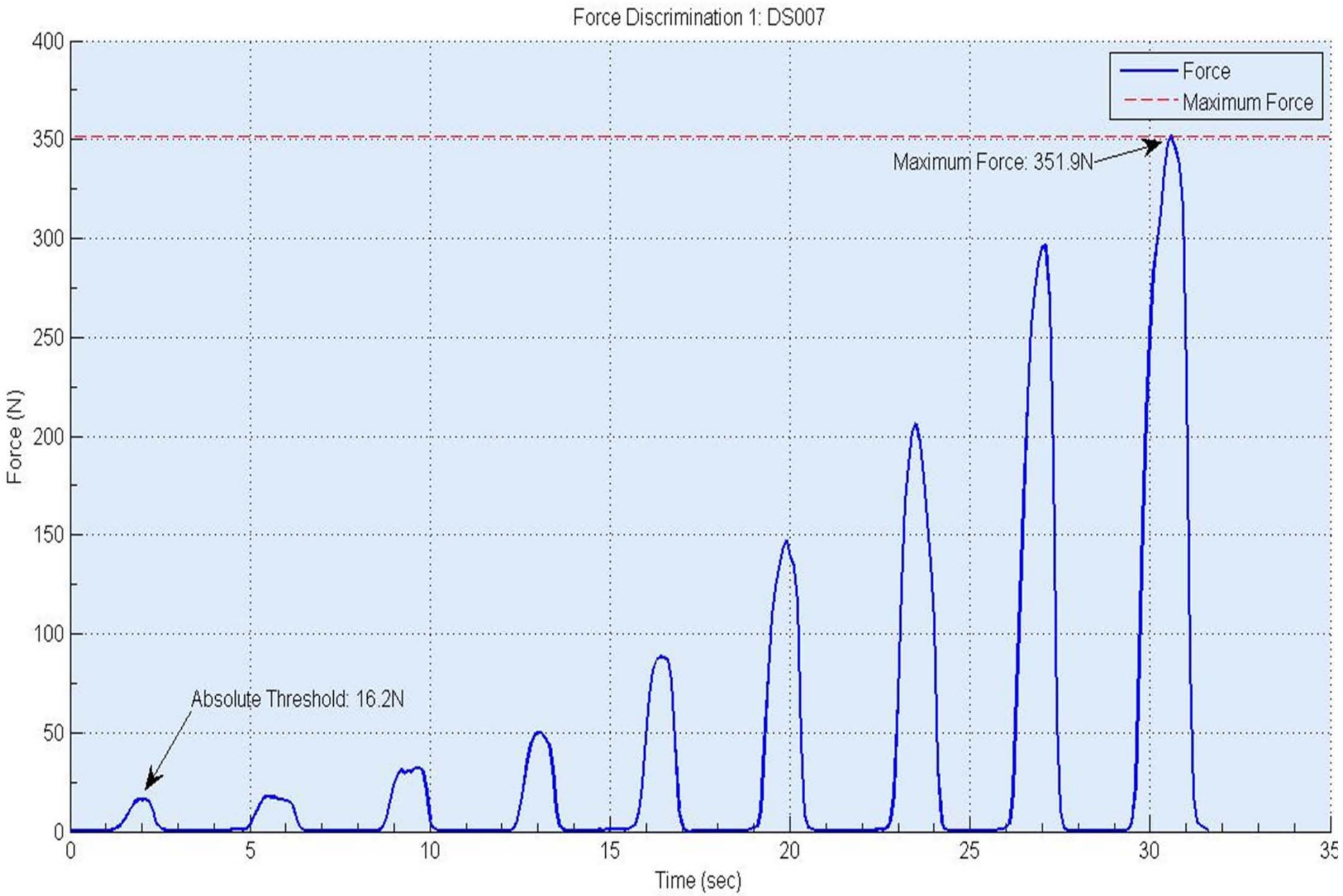


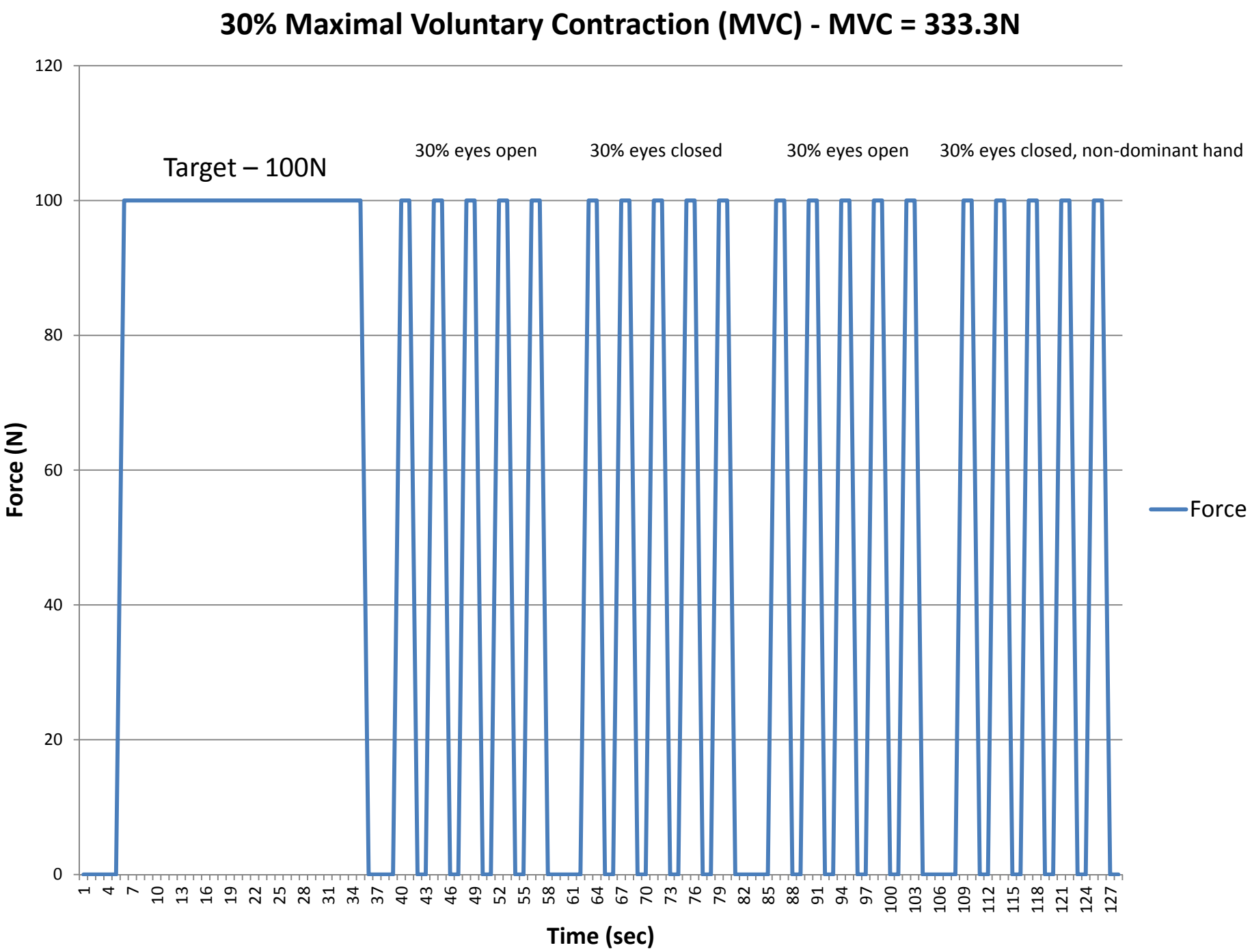
Experimental Protocol

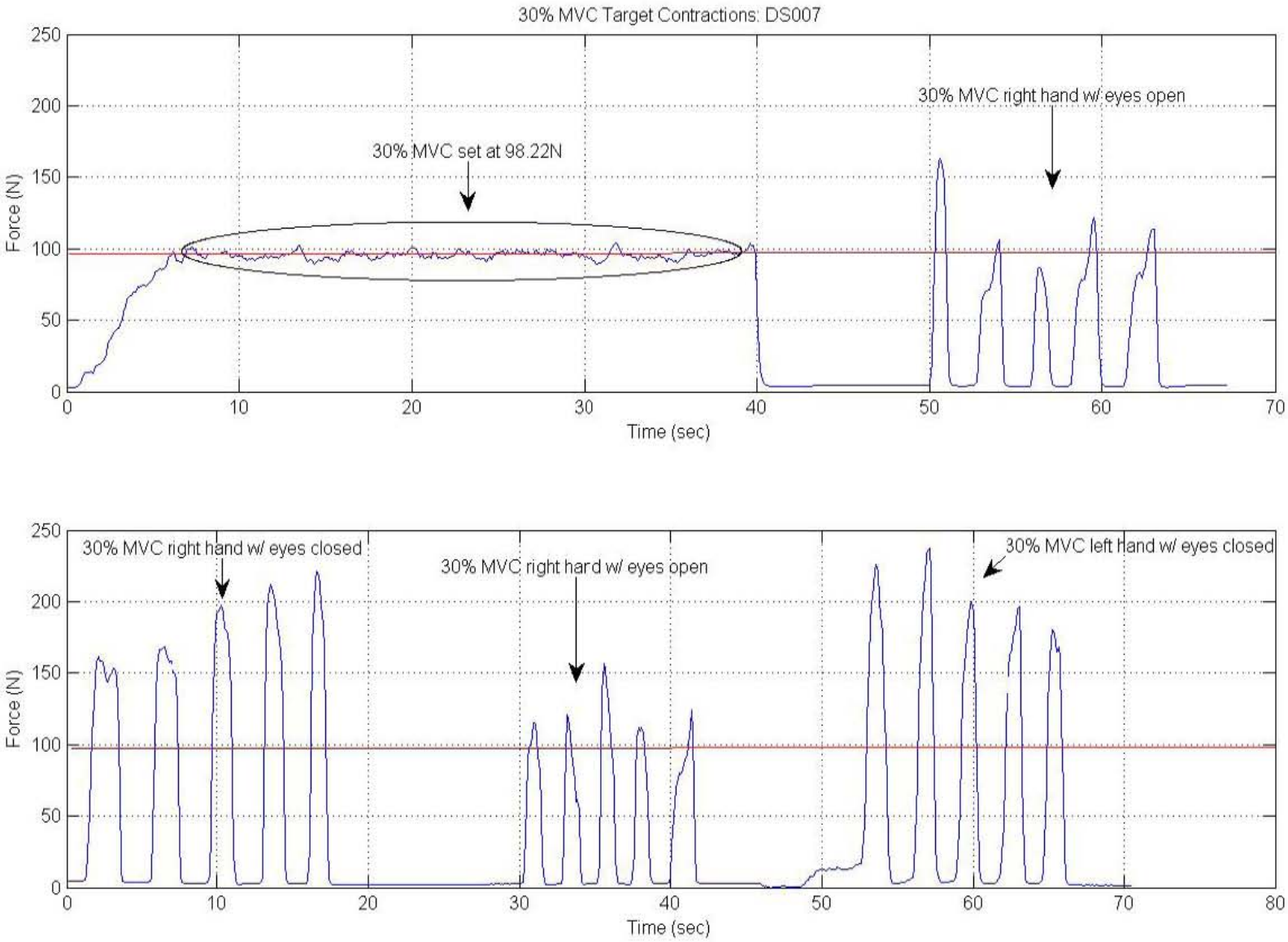
- Effects of Fatigue on Force Discrimination
  - Force discrimination tasks
  - Fatigue task grip for 2s MVC, 2s rest for 30 contractions
  - Force discrimination tasks at 1 min intervals with 5 minutes rest between tasks

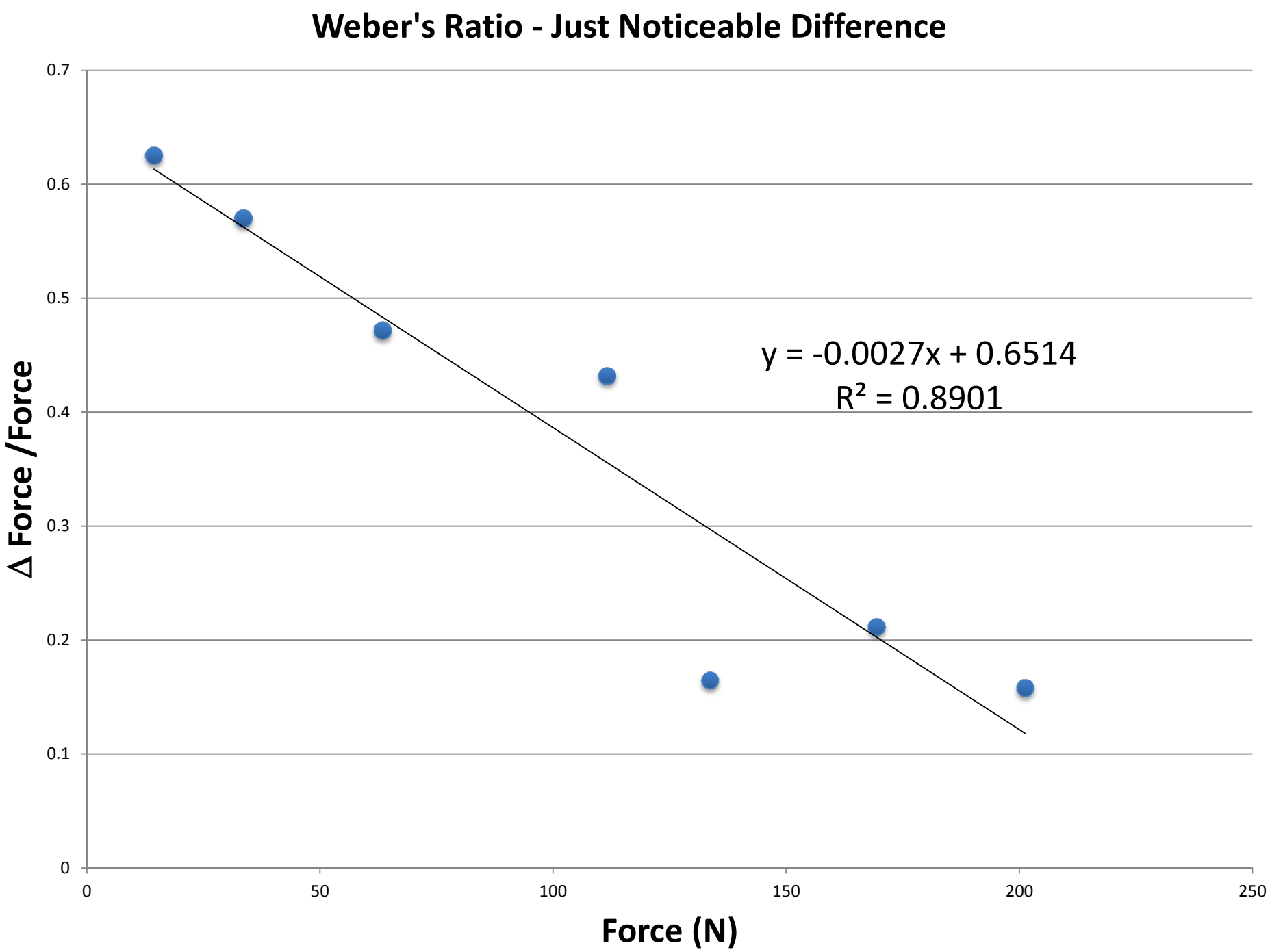



Force Discrimination
12
10
8
6
4
2
0
Force (N)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Time (sec)
Force

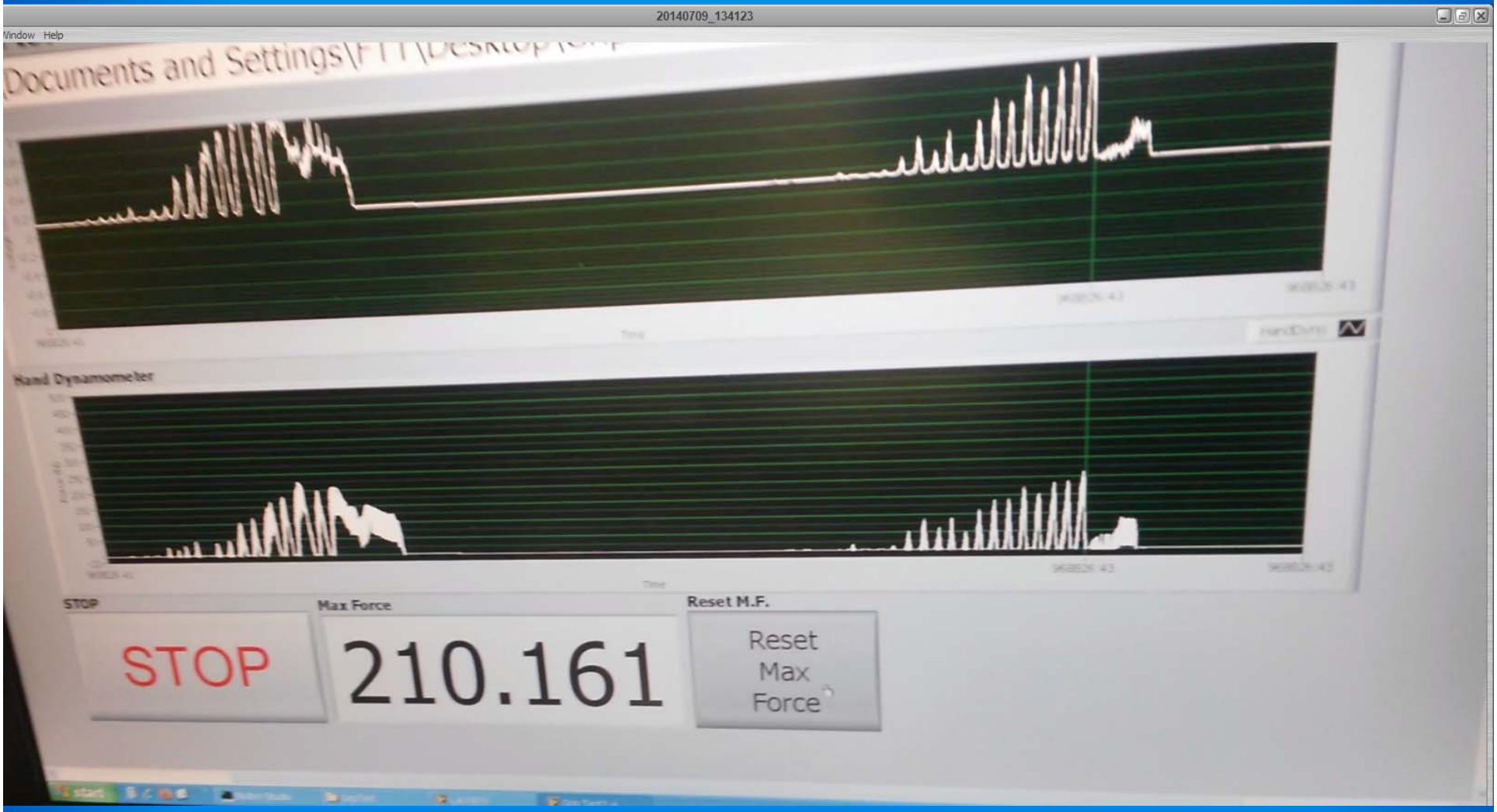

Force Discrimination 1: DS007
Force
Maximum Force
Maximum Force: 351.9N
Absolute Threshold: 16.2N
Force (N)
Time (sec)
0
50
100
150
200
250
300
350
400
0
5
10
15
20
25
30
35


30% Maximal Voluntary Contraction (MVC) - MVC = 333.3N
Target – 100N
30% eyes open
30% eyes closed
30% eyes open
30% eyes closed, non-dominant hand
Force (N)
Time (sec)
Force
0
20
40
60
80
100
120
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
49
52
55
58
61
64
67
70
73
76
79
82
85
88
91
94
97
100
103
106
109
112
115
118
121
124
127


30% MVC Target Contractions: DS007
30% MVC set at 98.22N
30% MVC right hand w/ eyes open
Force (N)
Time (sec)
30% MVC right hand w/ eyes closed
30% MVC right hard w/ eyes open
30% MVC left hand w/ eyes closed
Force (N)
Time (sec)


Weber's Ratio - Just Noticeable Difference
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Δ Force /Force
y = -0.0027x + 0.6514
R² = 0.8901
0
50
100
150
200
250
Force (N)

EMG Data


20140709_134123
Window Help
Documents and Settings\
Hand Dynamometer
STOP
Max Force
Reset M.F.
STOP
210.161
Reset
Max
Force

Conclusion

- Psychophysical technology to determine force discrimination
- Fatigue effects force discrimination
- Muscle memory depends on vision

Acknowledgements

- **Alix Dudley**
- **Dr. Millard Reschke**
- **Jody Cerisano**
- **Igor Kofman**
- **Liz Fisher**
- **Jan Cook**
- **Elisa Allen**
- **Testing Volunteers**
- **Neuroscience Lab**